

IN THE DRAWINGS:

Attached are the replacement drawings.

REMARKS

Claims 3 - 10 are in this application and are presented for consideration. By this Amendment, Applicant has canceled original claims 1 and 2 in favor of the new claims. New claim 3 is similar to original claim 1 but has been represented in the U.S. style and paying close attention to the objections and rejections based on form. New claim 4 is similar to claim 2. New claim 5 is similar to claim 1 but highlights each individual element in particular and defines the sealing barrier structure based on the diaphragm spring washer with edges bearing against the surface of the housing and face of the constraint member as claimed. Claims 6 and 7 are similar to original claim 2. New claim 8 is similar to claim 5 and further highlights the floating mount of the laminar rings.

Priority:

The correct priority number is FI2003A000001. Applicant's representative notes that the photocopy of the first page of the certified copy clearly indicates this. It is noted that the Examiner may be viewing a poorly scanned version of the original. The front page of the EP published application EP 1435466 is wrong due to a mistake by the EPO. No further comment should be needed. However, it is noted that the priority number was properly indicated in the application form filed with the EPO. A copy of the filing document of the EP application is enclosed as an evidence. It can be noted The Examiner can see the filed documents on the epoline server (<http://ofi.epoline.org/view/GetDossier>) where the whole electronic file is available for inspection. The filing date is clearly shown in the certified copy of the priority

document. The certified copy of the priority document includes a copy of the filing receipt, where the filing date is typed. Enclosed herewith is a further copy of the filing receipt where the filing date is highlighted. The filing date is written in letters rather than numbers and is of course in Italian. The date January 2, 2003 which the examiner has noted in the priority document is the date on which the filing papers were prepared. The filing papers are usually prepared the day before filing. The Italian PTO requires this (useless) data to be included in the filing papers. However this is not the filing date. In conclusion: the priority date is January 3, 2003 and the priority number is FI2003A000001. Priority has been perfected.

Drawings

Applicant has submitted replacement sheets. In these, reference number 7 has been deleted.

Specification

The title has been changed. The applicant has adopted the title as published in the EP application, i.e. "Wide-angle constant velocity joint". Section headings have been included. Reference number 40C on page 3, last line has been changed to 40A as correctly indicated by the examiner. No new matter has been added.

Claim Objection

The newly presented claims present elements separated by a line indentation as noted

in 37 CFR 1.75(i). However, it must be kept in mind that there is no such requirement for indentation. Rule 1.75(i) is a suggestion and presents no requirement.

Claim Rejections - 35 USC § 112

The original claims have been rejected as being indefinite. Applicant has carefully considered these comments with regard to presenting the new claims. It is Applicant's position that the new claims are clear, definite and fully conform with the requirements of the statute.

Claim Rejections under 35 USC §103

The claims have been rejected as being unpatentable over US 5,419,740 – Koyari et al. (the primary reference) in view of US 3,429,144 - McIntosh (the secondary reference). The rejection is based on the position that it would be obvious to use Belleville washers as taught be McIntosh in the device of Koyari et al. based on the use of washer structures in each device as centering means for a constraint member.

The rejection in essence is based on the position that it would have been obvious to replace the washers 106 and 108 of the primary reference with Belleville washers or springs as disclosed in the secondary reference, since both have the function of centering a mechanical member with respect to another mechanical member. However, this is not reasonable as each reference teach arrangements of different functional and dynamic relationships. There is at least a lack of a teaching reference noting the desirability and reasonableness of such a selection of one feature and shoving it into a much different construction.

Koyari et al. presents various embodiments with at least the embodiment of Fig. 10 employing what can be considered washer structures, namely washer type structures 116 and 110 (see Fig. 10). The embodiment of Fig. 7 presents leaf springs 106 and 108 but these are not washers. More importantly, these elements are not positioned as specified in the claim (with portions contacting the surface of the housing and face of the constraint member (see further discussion below).

The rejection is not supported by the teachings of the references. Further, the references fail to recognize the problem involved, particularly with the combination of features with a closed lubricant space as claimed. The problem underlying the invention is not to provide proper centering of the constraint member 20 into the seat 24, but rather (as clearly disclosed in the application) to increase sealing against leakage of grease from the seat 24 to the exterior of the joint.

Thus, starting from the primary reference the person skilled in the art would not have looked into the secondary reference to find a suggestion to solve any problem, and particularly not the problem involving sealing the lubricant space. Further, there is no recognition of a problem in either reference.

The Belleville spring of McIntosh is not arranged between mutually slidingly movable members between which sealing against grease leakage shall be provided. The way in which the Belleville springs are used in the claimed invention and the way of exploiting their elastic characteristics in the claimed invention is different from the use made in the secondary reference. As such, there is no suggestion the references to provide the combination of features

as claimed.

Additionally, the secondary reference does not at all face the problem of increasing the sealing against grease leakage. The washers 43 are arranged in a closed chamber where no leakage could occur. Thus, the skilled in the art would not have had any reason to combine the primary and the secondary reference together.

The ring 40 of the application may be considered the equivalent of rings 114, 116 of the primary reference. The claim clearly indicates that the rings 40 are arranged between each of the two surfaces 24A, 24B and the constraint member. The washers 106, 108 of the primary reference are not corresponding to members 40 and are not arranged as specified in the claims. Thus, even if these washers were replaced by the Belleville springs disclosed in the secondary reference, they would be mounted solid to the constraint member (20 in the application; 54 in the primary reference) and they would act against the rings 114, 116, which would remain flat. Moreover, even if the primary and the secondary references were combined, this combination would not result in the invention as claimed. Indeed, the claim requires that the outer edge of the Belleville spring rests on the surface 24A or 24B, while the inner edge of the Belleville spring rests on the opposing surface of the constraint member 20. Neither the secondary reference nor the primary reference would teach to the skilled in the art in which position to place the Belleville springs, so that one of the important features of the invention, which is needed to solve the problem underlying the invention, would not be derivable from the prior art.

As far as the Belleville spring is used to center a member as taught by the secondary reference, the orientation according to which said spring is mounted is irrelevant. The Belleville

springs disclosed in McIntosh do not have a central hole. Thus, they do not have an inner edge but only an outer edge. This is a further reason why the combination of the two references would not lead to the claimed invention.

The invention provides a joint that is not for centering the discoidal member, but rather to provide a very efficient lubricant retention (sealing) thus reducing lubricant consumption. The specification is very clear in stating which is the object of the invention. As stated on page 3, lines 19-24, if the rings 40 are flat as in conventional joints, their leakage prevention effect is very limited. Grease contained in the volume 24 is rapidly dispersed. This is due to several factors, among which the following shall be mentioned.

A limited pressure is exerted between the flat laminar rings 40, the walls 24A, 24B and the side walls of discoidal member 20. Leakage between two moving members is best prevented if a high pressure is exerted between the moving members. In order to generate a high pressure, a force must be applied which increases if the contact surface increases. In other words, if a pressure of say 100 N/cm^2 is required to obtain proper sealing, said pressure is achieved by applying a force equal to 100 N if the surface of contact is 1 cm^2 . However, if the surface of contact is 10 cm^2 , ten times the force (i.e. 1000 N) must be applied. Using a flat ring 40 results in a low pressure between the ring on the one side and the surfaces contacting the ring on the other (surface 24A, 24B; surfaces of discoidal member 20).

To increase this pressure too high a force would be necessary against the moving discoidal member 20, the motion of which would then be hindered.

A further factor which adversely effects the efficiency of flat rings is the thermal

expansion. Temperature causes expansion of the metal parts of the joint, which increases the clearance between the moving disc 20 and the flat rings 40, again reducing the sealing effect.

Also wear plays an important role since the movement of the disc 20 and of the flat laminar rings 40 causes wear and consequent increase of the clearance between moving members. This in turn results in poor sealing.

The invention is based on the idea of employing Belleville springs which are shaped and arranged as claimed, i.e. the outer edge of the Belleville spring bears against the surface 24A or 248 while the inner edge bears against the opposing face of the constraint member 20. The result of this special arrangement is that an increased pressure is generated along the two circumferential edges of the Belleville spring. A very high local pressure can be achieved just there where it is necessary to obtain efficient sealing against grease leakage. A relatively very low axial force is required to generate this high pressure.

In the design according to the invention a much lower force is required to achieve much higher local pressure values and thus more efficient leakage prevention.

Sealing efficiency is maintained even if the movable members are subject to wear, because the increased clearance is compensated by the deformation of the Belleville spring.

According to the invention, even substantial wear of the sliding surfaces does not lead to loss of sealing effect, because the Belleville spring simply tends to recover part of its elastic deformation thus compensating for the increased clearance. Even though the pressure along the contacting surface (the inner and the outer edges) is lowered, a substantial sealing effect is still retained. Similar beneficial effects are achieved in terms of compensating for thermal

dilations and consequent clearance increase.

Accordingly, Applicant respectfully requests that the Examiner reconsider the rejection in view of the new claims presented by this Amendment. The references as a whole fail to suggest the combination of features claimed. Neither the cited references suggests the particular contact edges contact a surface and a face as claimed. Further, there is a lack of a teaching reference suggesting the desirability of dropping the features of Koyari et al. and instead adopting the features of McIntosh. Of course such a combination of features would not present the combination as specified. Further, the change at best would be a starting point for which a person of ordinary skill would need to experiment in order to attain any useful structure. This is particularly apparent when considering the lack of McIntosh's teaching with regard to passages for seats and connections with fork elements as well as the particular deployment of spring elements in the embodiment of 7 of Koyari et al. wherein discrete spring portions are provided to achieve particular result.

EP Search Report - Information Disclosure Statement

Applicant requests that the Examiner consider references which have come to Applicant's attention based on a Search Report issued less than three months ago (the Search Report is dated April 21, 2005) wherein the references were not previously known to Applicant.

EP 1 253 338 has been cited as technological background. Applicant attaches a copy of the European Search Report and asks the Examiner to consider the comments of that Search Report including any further statements as to relevancy. Applicant also attaches an English

language abstract and notes that U.S. 2002/187840 and U.S. 6,719,636 are indicated to be corresponding English language documents by the European Patent Office.

U.S. 4,799,817 is cited under Category A.


GB 894,806 has been cited under Category A.

U.S. 4,490,125 has been cited under Category A.

Consideration of the particulars of the European Search Report as well as the references noted above is requested.

Respectfully submitted
for Applicant,

By:


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Enclosed: (4) Replacement Sheets of Drawings
Substitute Specification
Marked-Up Version of the Specification
copy of Sheet from Priority Document
copies of Sheets from European Patent Office
PTO-1449 Form
European Search Report
copies of (6) References

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SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-0410.

I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS EXPRESS MAIL IN AN ENVELOPE ADDRESSED TO:

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